MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2015/2016 SESSION

TDC1231 – DATA COMMUNICATIONS AND NETWORKING

(All Sections / Groups)

9th March 2016
2.30p.m. – 4.30p.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This Question paper consists of 4 printed pages including cover page with 7 questions only.

2. Attempt **SIX** out of **SEVEN** questions. All questions carry equal marks and the distribution of marks for each question is given.

3. Please write all your answer in the Answer Booklet provided.

Question 1

a) There are two possible types of connections and four categories of physical topology in data communications.
   i) Briefly explain the TWO types of connections. [2 marks]
   ii) Categorize the FOUR basic topologies in terms of type of connections. [2 marks]
   iii) Draw a hybrid topology with a star backbone connecting ONE bus network with four nodes and TWO ring networks with four nodes each. [3 marks]

b) Differentiate local area network (LAN) and wide area network (WAN) in terms of size or distances, structure and ownership. [3 marks]

Question 2

a) A host communicates with another host using the TCP/IP suite.
   i) What is the unit of data sent and received at each of the following layers?
      a. Application layer [0.5 marks]
      b. Network layer [0.5 marks]
      c. Data-link layer [0.5 marks]
      d. Physical layer [0.5 marks]
   ii) Which TWO layers are involved in a link-layer switch? [1 mark]

b) A periodic composite signal with a bandwidth of 2000 Hz is composed of two sine waves. The first one has a frequency of 100 Hz with maximum amplitude of 20V; the second one has maximum amplitude of 5V. Draw the bandwidth. [2 marks]

c) A device is sending out data at the rate of 1000 bps. How long does it take to send a file of 100,000 characters? Note that 1 character is equivalent to 8 bits. [2 marks]

d) In telecommunications, transmission media can be classified as guided and unguided.
   i) How do guided media differ from unguided media? [1 mark]
   ii) Provide ONE example for each type of transmission media respectively. [2 marks]

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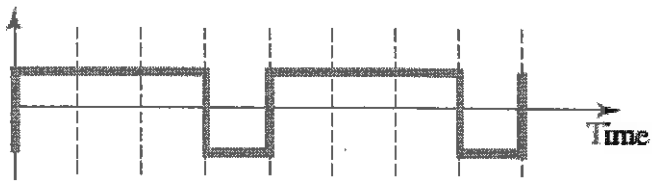
Question 3

a) List THREE possible causes of transmission impairment. [1.5 marks]

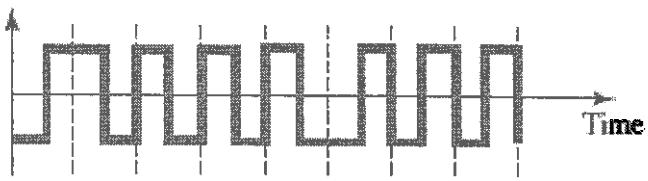
b) A signal with 200 milliwatts power passes through 10 devices, each with an average noise of 2 microwatts.
   a. What is the SNR? [1.5 marks]
   b. What is the SNR_{dB}? [1 mark]

c) Find the 8-bit data stream for the following coding schemes.
   i) NRZ – I scheme



[1 mark]

   ii) Differential Manchester scheme



[1 mark]

d) Illustrate the result of scrambling coding scheme the sequence **11100000000000** using the following scrambling techniques. Assume that the last non-zero signal level has been negative.
   i) B8ZS [2 marks]
   ii) HDB3 (The number of nonzero pulses is odd after the last substitution) [2 marks]

Question 4

a) In parallel transmission, multiple data can be transmitted at one time between two communicating devices.
   i) Illustrate (draw) parallel transmission. [2 marks]
   ii) Briefly explain ONE advantage and ONE disadvantage of parallel transmission. [2 marks]

b) Given a binary word **101110000**,
   i) What is the polynomial representation? [2 marks]
   ii) What is the result of shifting the binary word three bits to the left? [1 mark]

c) Given the dataword **101001111** and the divisor **10111**, show the generation of codeword at the sender site (using binary division). [3 marks]

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Question 5

a) Use a suitable diagram to discuss the concept of multiplexing in telecommunication system. [3 marks]

b) Assume that a voice channel occupies a bandwidth of 4 kHz. We need to multiplex 10 voice channels with guard bands of 500 Hz using FDM. Calculate the required bandwidth. [1 mark]

c) Switching is a topic that can be discussed at several layers. Identify the layer and type of switching happen in TCP/IP protocol suite. [6 marks]

Question 6

a) List and classify TWO random access, controlled access and channelization protocols based on taxonomy of multiple-access protocols. [3 marks]

b) The Ethernet address is 6 bytes (48 bits), normally written in hexadecimal notation.
   i) What is the hexadecimal equivalent of the following Ethernet address?
   01011010 00010001 01010101 00011000 10101010 00001111 [2 marks]

   ii) How does the Ethernet address 1A:2B:3C:4D:5E:6F appear on the line in binary? [2 marks]

c) What is the difference between unicast, multicast, and broadcast addresses? [3 marks]

Question 7

a) Give THREE reasons why the CSMA/CD algorithm does not work in wireless LANs. [3 marks]

b) Using suitable table, differentiate FOUR wireless LAN specification including 802.11a, 802.11b, 802.11g and 802.11n in term of their techniques, band, modulation and rate (Mbps). [4 marks]

c) What do we mean when we say that a switch can filter traffic? Why is filtering important? [1 mark]

d) Which one has more overhead, a hub or a switch? Explain your answer. [2 marks]

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